

CALIBRATION STANDARD SPECIFICATION

FOR A

LOW RANGE TEMPERATURE BATH

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PROCUREMENT PACKAGE

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LOW RANGE TEMPERATURE BATH

1.     SCOPE

1.1 Scope. This specification defines the mechanical, electrical, and electronic characteristics for a low range (-60°C to +100°C) temperature bath. This equipment is intended to be used by Navy personnel in shipboard and shore-based laboratories to perform calibrations on thermometers and other temperature measuring equipment. For the purposes of this specification, Low Range Temperature Bath shall be referred to as the LRTB.

## 2. APPLICABLE DOCUMENTS

2.1 Controlling Specifications. MIL-T-28800, "Military Specification, Test Equipment for use with Electrical and Electronic Equipment, General specification for," and all documents referenced therein of the issues in effect on the date of this solicitation shall form a part of this specification.

## 3. REQUIREMENTS

3.1 General. The LRTB shall conform to the Type II, Class 5, Style E requirements as specified in MIL-T-28800 for Navy shipboard and shore-based use as modified below. The use of material restricted for Navy use shall be governed by MIL-T-28800.

3.1.1 Design and Construction. The LRTB design and construction shall meet the requirements of MIL-T-28800 for Type II equipment.

3.1.2 Power Requirements. The LRTB shall operate from a source of 103.5V to 126.5V at 60 Hz +/-5% single phase input power as specified in MIL-T-28800.

3.1.2.1 Fuses and Circuit Breakers. Fuses or circuit breakers shall be provided. If circuit breakers are used, both sides of the power source shall be automatically disconnected from the equipment in the event of excessive current. If fuses are used, only the line side of the input power line as defined by MIL-C-28777 shall be fused. Fuses and circuit breakers shall be readily accessible.

3.1.2.2 Power connections. The requirements for power source connections shall be in accordance with MIL-T-28800 with a eight foot minimum length for the power cord.

3.1.3 Dimensions and Weight. The LRTB maximum dimensions shall not exceed 24 inches in width, 48 inches in height, and 40 inches in depth. The weight shall not exceed 500 pounds.

3.1.4 Lithium Batteries. Per MIL-T-28800, lithium batteries are prohibited without prior authorization. A request for approval for the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposal. Approval shall apply only to the specific model proposed.

3.2 Environmental Requirements. The LRTB shall meet the environmental requirements for a Type II, Class 5, Style E equipment with the deviations specified below.

3.2.1 Temperature and Humidity. The LRTB shall meet the conditions below:

	<u>Temperature (°C)</u>	<u>Relative Humidity (%)</u>
Operating	10 to 30	95
	30 to 40	75
Non-operating	-40 to 70	Not Controlled

3.2.2 Electromagnetic Compatibility. The electromagnetic compatibility requirements of MIL-T-28800 are limited to the following areas: CE01, CE02, CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (back panel search excluded), RE02 (14 kHz to 1 GHz), and RS03.

3.3 Reliability. Type II reliability requirements are as specified in MIL-T-28800.

3.3.1 Calibration Interval. The LRTB shall have an 85% or greater probability of remaining within tolerances of all specifications at the end of a 12 month period.

3.4 Maintainability. The LRTB shall meet the Type II maintainability requirements as specified in MIL-T-28800 except the lowest discrete component shall be defined as a replaceable assembly. Certification time shall not exceed 60 minutes.

3.5 Performance Requirements. The LRTB shall provide the following capability as specified below. Unless otherwise indicated, all specifications shall be met following a 30-minute warm-up period.

3.5.1 LRTB Performance Requirements.

3.5.1 Temperature Range. The LRTB shall have a minimum temperature range of -73°C to 120°C.

3.5.1.1 Temperature Control Knob. The LRTB shall have a temperature control knob.

3.5.2 Temperature Control Stability and Gradient. The LRTB shall have a minimum temperature control stability of 0.1°C throughout the entire bath after equilibrium occurs at any operator defined set point throughout the temperature range.

3.5.2.1 Temperature Bath Equilibrium. The LRTB shall achieve temperature equilibrium at given set point within 15 minutes of arriving within +/-0.5°C of that specific temperature setting.

3.5.2.2 Temperature Bath Slew Rate. The LRTB shall slew from 25°C to -45°C in 3 hours or less. The LRTB shall slew from 202°C to 200°C in 2 hours or less.

3.5.3 Working Volume. The LRTB shall have a minimum working volume of 13 inches in width, 10 inches height, and 12 inches length. The working volume shall have a liquid capacity of 9 gallons.

3.5.4 Working fluid Pump. The LRTB shall have a pump that circulates the working fluid.

3.5.4.1 Surface Turbulence. The LRTB's pump shall circulate the working fluid utilizing a methodology such that the surface turbulence is less than  $\pm 0.20$  inches.

3.5.4.2 Flow Rate. The LRTB shall have a liquid flow rate of up to 450 gal/hr.

3.5.4.2.1 Flow Rate Controller. The liquid flow rate shall be adjustable from a controller or control knob.

3.6 Operating Requirements. The LRTB shall provide the following capabilities.

3.6.1 Front Panel Control requirements. All modes and functions shall be operable using the front panel controls. The locations and labeling of indicators, controls, and switches shall provide for maximum clarity and easily understood operation without reference to tables, charts, or flow diagrams.

3.6.2 Temperature Display. The LRTB shall have a digital temperature display that has a minimum of 3 1/2 digits.

3.6.2.1 Temperature Display indication. The LRTB's temperature display shall indicate both the temperature set point and the actual bath temperature.

3.6.2.2 Temperature Display resolution. The LRTB shall have a minimum temperature display resolution of  $\pm 0.1$  C.

3.7 Manual. At least two copies of an operation and maintenance manual shall be provided. The manual shall meet the requirements of MIL-M-7298.

3.7.1 Calibration Procedure. The manual shall provide a LRTB calibration procedure in accordance with MIL-M-38793.

3.8 Accessories. The LRTB shall include the following accessories.

3.8.1 Temperature Bath Fluid. A minimum of ten gallons of the appropriate bath fluid for operation from  $0^{\circ}\text{C}$  to  $120^{\circ}\text{C}$  shall be included with the LRTB.

3.8.3 Swivel casters. The LRTB shall have swivel casters.